Chapter 10

Insulation Contractor

The insulation contractor is affected more than any other subcontractor by energy efficient construction practices. Because energy efficient homes are better insulated, the insulation contractor sells more product. The wide variety of approaches to Super Good Cents construction requires a wide variety of insulation strategies and products.

It is safe to assume that R-values for Super Good Cents homes are higher than most state codes, but often you do not know actual R-values until the Super Good Cents utility representative reviews the house plan. In many cases, R-values in one component are boosted to compensate for lower performance of other components.

Bidding the job before plan review may lead to unpleasant surprises. To avoid surprises and re-figuring bids, make sure the general contractor has had the plans reviewed and that the utility has approved R-values shown on the plans.

Super Good Cents utility representatives look at the quality of installation. Train employees in correct application. Make sure your bids include time to do thorough and careful insulating.

FLOOR INSULATION

Floor insulation levels vary from house to house. Underfloor insulation is typically R-30 to R-38.

How the Floor Framing System Affects the Insulation Contractor

Post and beam floors using 4x6 beams do not easily accommodate R-30 and higher insulation. Since typical R-30 insulation is 9-1/2 inches deep, these floors are too shallow to allow full insulation loft. You need an additional suspension system. See Figure 10B.

The trick is to get a suspension system that does not compress insulation. Compressing insulation is like throwing away part of the purchased R-value during installation.

In some cases, the designer or general contractor simply has not thought about the new conservation measures. Mention potential conflicts between floor framing cavities and required insulation. 4x8 beams and 2x8 joists accommodate high density R-30 insulation. See Figure 10C. Many builders find deeper floor framing less expensive. (Spans can be longer so fewer rows of posts and beams are needed.)

Figure 10A
JOISTED FLOOR INSULATION

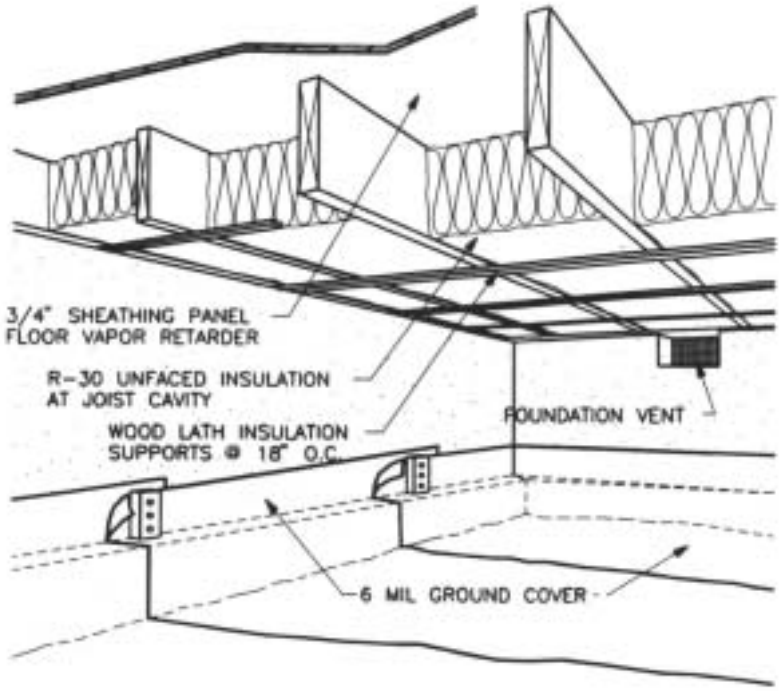


Figure 10B
POST AND BEAM FLOOR WITH SUSPENDED INSULATION SUPPORTS

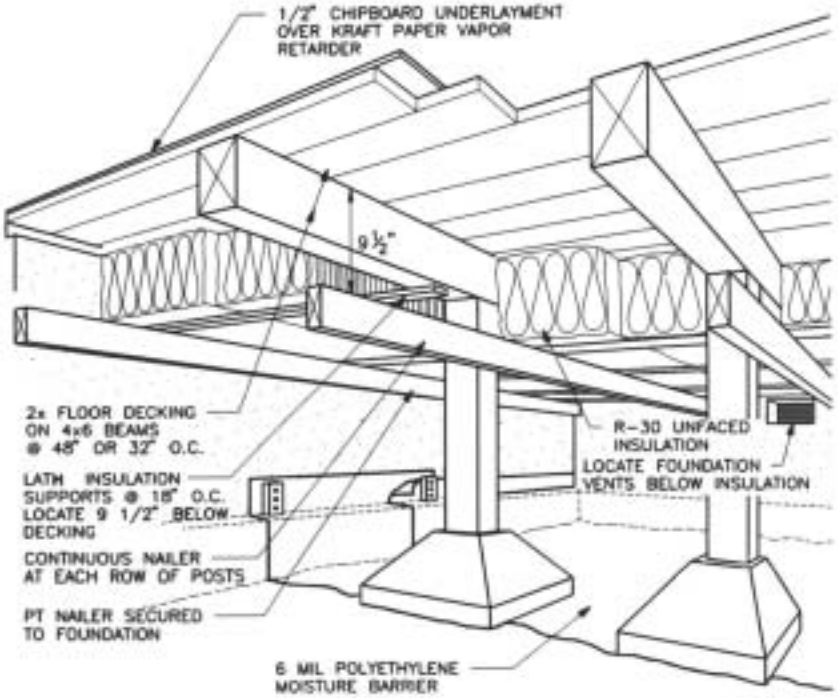
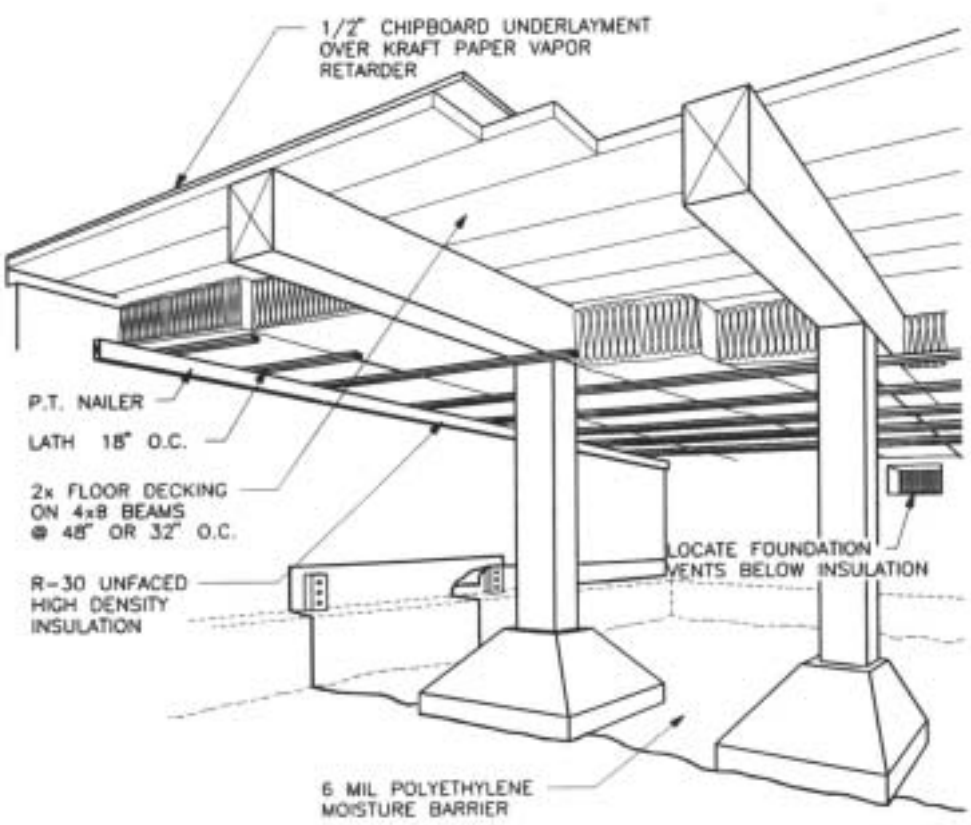


Figure 10C
POST AND BEAM FLOOR WITH HIGH DENSITY INSULATION



If floor framing cannot be changed to accommodate Super Good Cents insulation, be sure your bid includes the cost of a suspension system.

I-beam floors require special “full width” batts. Standard width batts are not wide enough. They leave gaps at each side of the joist cavity that reduce the effectiveness of the insulation system.

Vapor Retarder

A 1-perm vapor retarder on the warm side of the floor insulation is a requirement of most building codes as well as the Super Good Cents program. The vapor retarder keeps indoor moisture from diffusing into floor cavities.

Some floor framing systems have built-in vapor retarders that prevent moisture diffusion through the floor. Three-quarter-inch plywood floors and three-quarter-inch wafer board are examples of sheathing products that qualify as vapor retarders. They have a perm rating of 1 or lower. You do not need faced batts with these floor framing systems.

2x floor decking, on the other hand, is not a vapor retarder. To meet vapor retarder requirements, place asphalted kraft paper or other appropriate material above the decking.

Half-inch chipboard subfloor is not a vapor retarder either. If asphalted kraft paper is not shown on the plans, use kraft or foil faced batts to meet floor vapor retarder requirements.

Adequate Support

Install floor insulation up against the floor, but do not let the suspension system compress it. Do not let insulation sag away from the floor. Make sure the suspension system supports batts evenly.

Ground Cover

A 6-mil polyethylene black ground cover is a requirement of most building codes as well as the Super Good Cents program. The cover prevents ground moisture from dampening floor insulation. The ground cover does not replace the 1-perm floor vapor retarder. They are separate moisture protection requirements.

Cover the entire area under the floor with the ground cover. Lap the cover at all seams. Local building codes may have more stringent requirements for crawl space ground covers. Check with your local building department.

Crawl Space Ventilation

There is not much the insulation contractor can do if the concrete subcontractor does not supply adequate crawl space venting. Most building codes as well as the

Super Good Cents program require venting to help keep the insulation and crawl space dry. Venting reduces potential growth of mold and mildew and structural damage to the floor. It also helps protect indoor air quality.

Super Good Cents specifications call for 1ft^2 net free vent area per 150 ft^2 of floor area. In some locales the minimum is 1 ft^2 net free vent area per 300 ft^2 of floor area. Check with the local code official for local requirements.

If a home is in an area with radon problems, local building code may require crawl space vents as a protection measure. Verify that the vents are adequate. Let the general contractor know if they are not.

Net free vent area typically is stamped on the side of the vent. If you do not see a stamp, assume that the net free vent area is approximately half the vent surface area. See Chapter 3 for more details on crawl space ventilation.

Floor insulation should not block vents or funnel outside air into or above insulation.

Protect Plumbing From Freezing

The thick layer of insulation in the floor makes the living area warmer and crawl space area colder in winter. Protect pipes from freezing. Three-quarter-inch black pipe insulation or heat tape are commonly used. Heat tape fails during power outages. See Figure l0D.

If you get the chance to make recommendations before the plumber begins work, suggest to the general contractor that plumbing be run just below the subfloor. Floor insulation can be installed below plumbing. That is the best way to prevent pipe freeze-ups.

WALL INSULATION

Wall cavity insulation values in Super Good Cents homes usually are at least R-21. Insulating sheathing often is installed on the exterior (Figure 10E shows above grade wall details) or interior of walls to raise total R-value to R-26 or even higher. See Chapter 9 for details on interior sheathing systems. Interior insulating sheathing could be installed by a number of different trades, including insulation contractors.

Many Super Good Cents homes have 24-inch on center framing in the walls. This may not show on the plans you use to make your bid. Ask the general contractor about frame spacing.

Remember, R-26 wall standards affect skylight wells, vault end walls, pony walls, stairwells, and any other wall that separates heated from unheated space.

Figure 10D
PIPE INSULATION

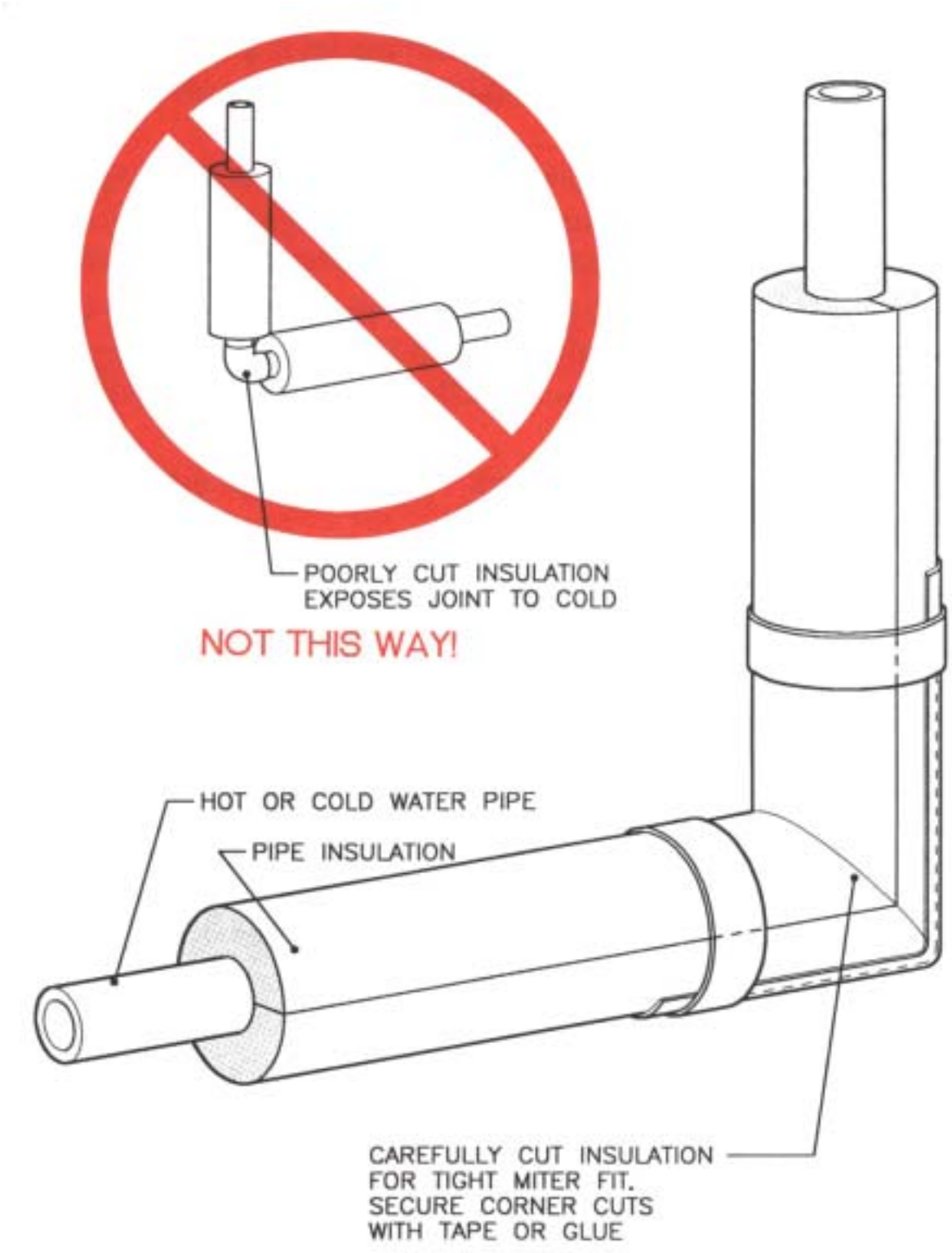
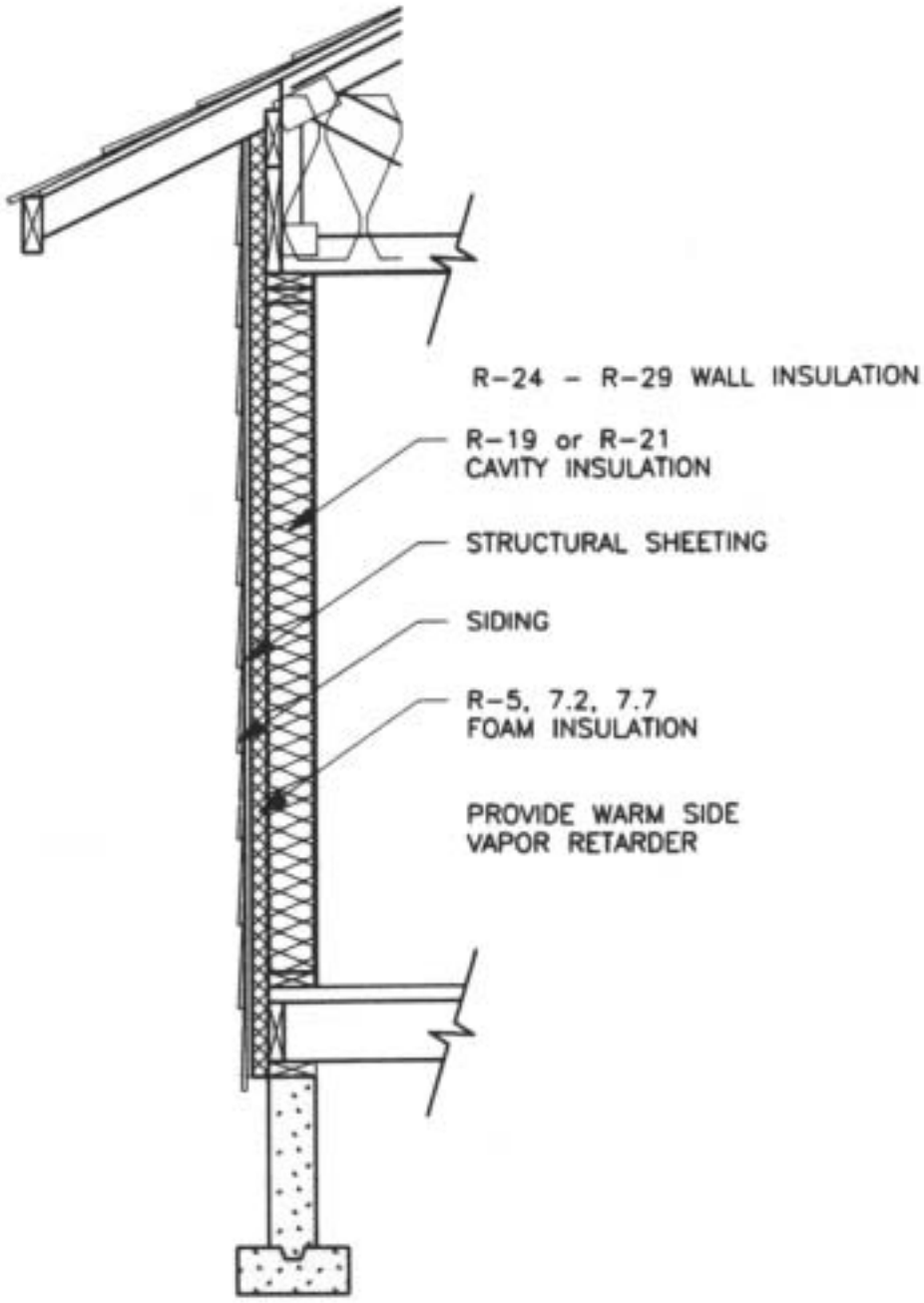


Figure 10E
ABOVE GRADE WALL WITH EXTERIOR RIGID INSULATION



Quality Work

The house is going to pass or fail based on quality of the insulation job. Do not cut wall insulation short or long. Cut it to fit the cavity. Do not cram insulation into the cavity. Place it in the cavity and fluff to its full loft.

Cut batts around switch and outlet boxes to minimize compression. See Figure 10F. Split batts around plumbing and wiring.

Vapor Retarders

Like most building codes, the Super Good Cents program requires a 1-perm vapor retarder on the warm side of wall insulation. Faced batts are a common way to meet this requirement.

Faced batts perform better if flanges are face-stapled rather than inset-stapled. See Figure 10G. Face stapling avoids compression of insulation.

Face stapling must be smooth. Carefully set staples, or you will make the drywall contractor's job more difficult. Finish the job by stapling facing to the top and bottom plates.

If you use unfaced batts instead, you must install a separate vapor retarder. One method is to use 4- to 6-mil polyethylene, lapped 3 inches where separate sheets meet, and stapled to the top and bottom plates.

Another popular vapor retarder is vapor retarder paint on the drywall. You may be able to make a more competitive bid if you shift the vapor retarder responsibility to the painter.

Since the vapor retarder strategy varies, ask the general contractor who is supplying the vapor retarder.

Unusual Walls

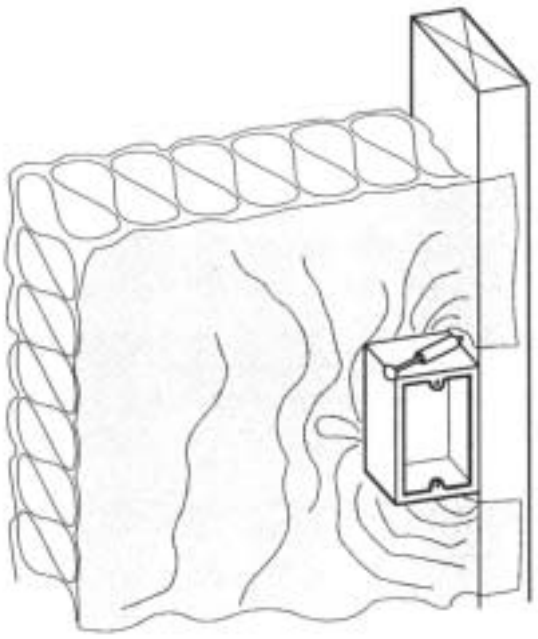
You may occasionally run into walls with features you have not seen before. Figures 10H and 10I show construction details for double walls and strap walls that call for two or three layers of batt insulation or extra thick blown insulation.

Strap walls may require high density insulation in the strapped cavity to achieve the R-values called for in the plans. Your supplier may have high density insulation on hand for commercial construction customers. When you see double walls or strap walls, check with the general contractor to find out what R-value to use in each framing cavity.

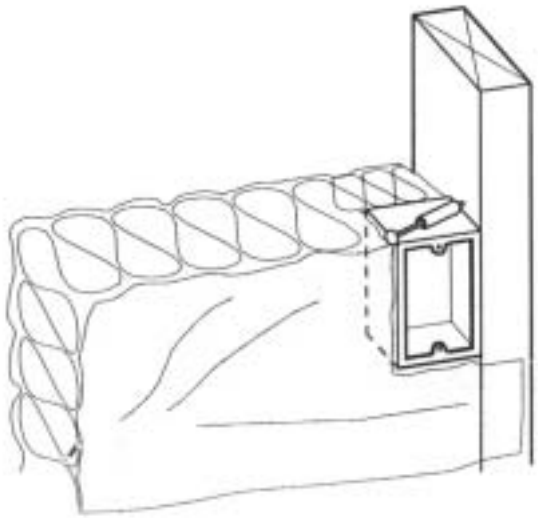
Air Sealing and Air Barriers

Air sealing and air barriers are new concepts in construction. Chapter 9, "Air Tightening Specialist," describes several air sealing and air barrier techniques.

Figure 10F
INSULATION CUT-OUT AT SWITCH BOX



WRONG!
INSULATION IS SMASHED BEHIND THE JUNCTION BOX



CORRECT
INSULATION CAREFULLY CUT TO FIT BEHIND JUNCTION BOX AND SNUGLY AT SIDES

Figure 10G
FACE STAPLING

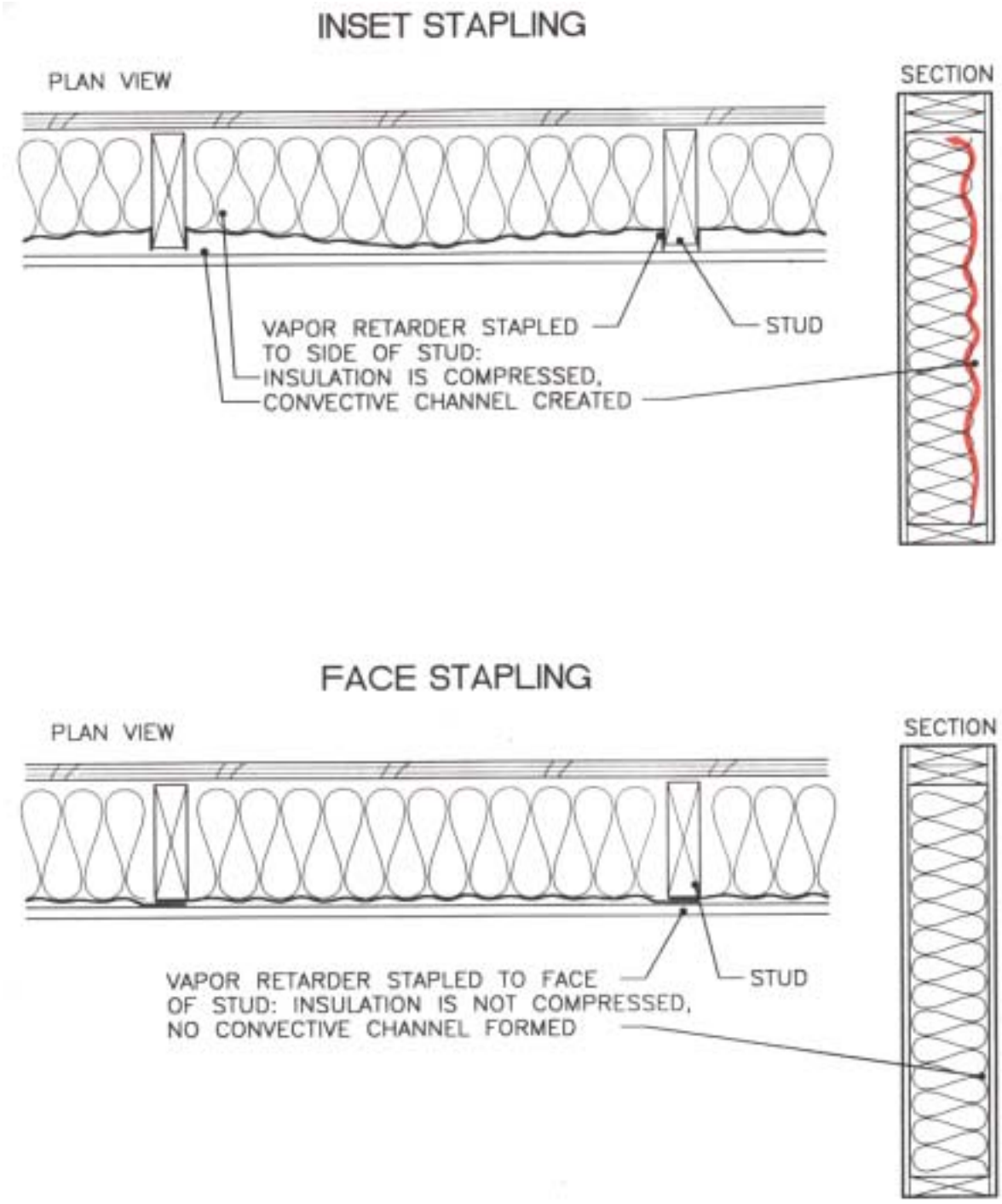


Figure 10H
DOUBLE WALL

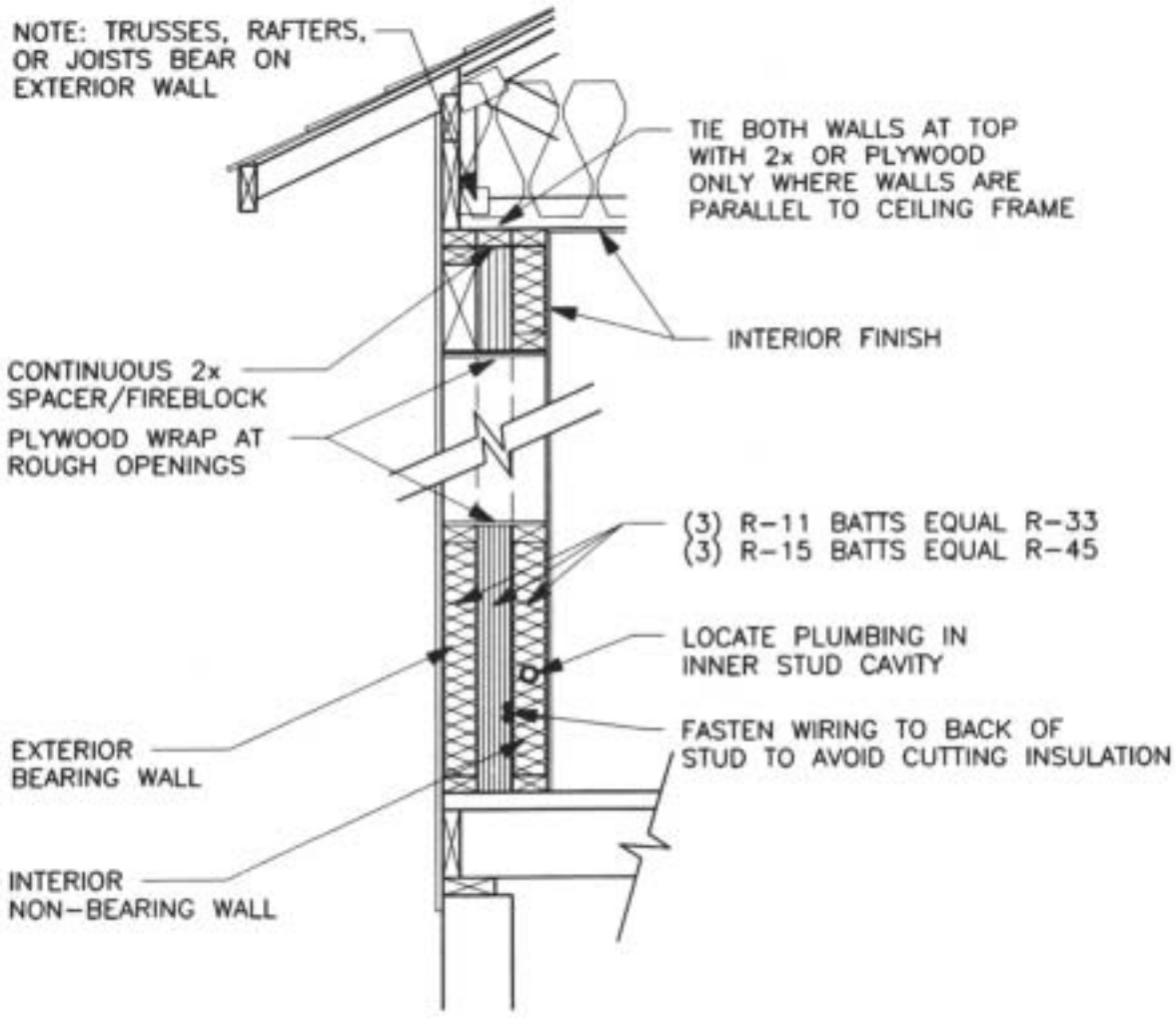
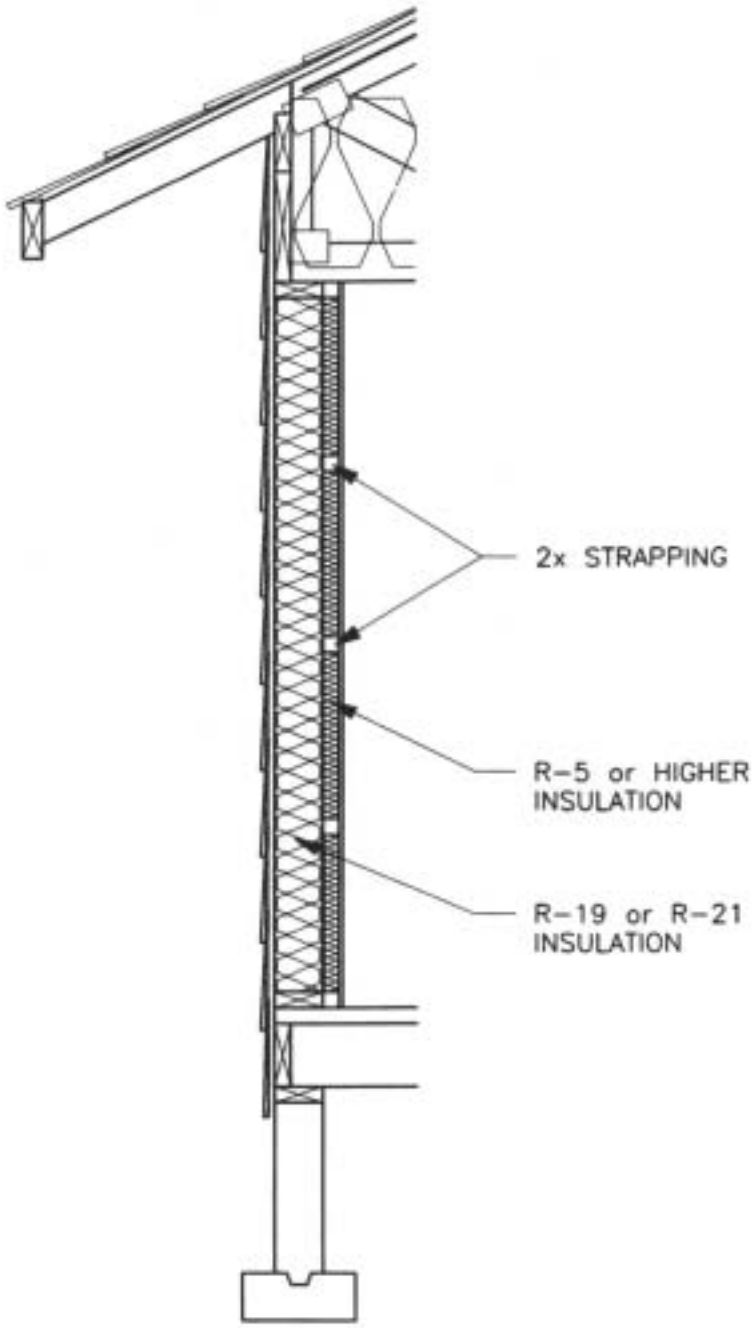


Figure 10I
STRAP WALL



Air sealing is a key component in energy performance of Super Good Cents homes. Someone is going to do it and get paid for doing it well. The insulation contractor is well-positioned to do the air sealing work and become the air tightening specialist on the construction team. Look into the work described in the "Air Tightening Specialist" chapter and consider expanding your insulation business.

ATTIC INSULATION

Attic or flat ceiling insulation in Super Good Cents homes is typically R-49. Many attics incorporate "Advanced Ceiling Framing," designed to get full R-49 over all exterior walls. In some cases, ceiling insulation may be beefed up to R-60 to compensate for lower thermal levels in other components.

Correct Application

Utility representatives and code officials look in the attic for the insulation certificate and bag label to verify correct insulation densities. Densities also may be spot-checked.

Fire Clearances

Preparing for the insulation job includes baffling flues and other electrical and mechanical components that are not rated for insulation cover.

NFPA-54, the National Fuel Gas Code, gives clearances for gas flues. Clearances for oil fired components are listed in NFPA-31, Standard for the Installation of Oil Burning Equipment. Masonry standards are given in NFPA-211, Standard for Chimneys, Fireplaces, and Vents. Order from the National Fire Protection Association, P.O. Box 9101, Quincy, MA 02269-9101;1-800-344-3555. Chapter 37 of the Uniform Building Code also addresses clearances for combustible materials.

Recessed lights in insulated spaces such as attics must be IC (insulation cover) rated if they are to be covered with insulation. If you find a non-IC rated fixture, let the general contractor know right away that you cannot cover it until it is replaced with an IC rated fixture.

Fire clearances required for non-IC rated lights leave big holes in the thermal envelope of the house. Super Good Cents utilities will not certify the house unless IC fixtures are installed.

Attic Hatch

Baffles are needed at the attic hatch to keep attic insulation from falling into the home. Some contractors use batts to form the baffle. They are easy to use and provide ceiling insulation as well. If the hatch is in the heated ceiling area, insulate it to at least R-38. Use balls or rigid foam board.

Advanced Frame Ceilings

Typical Super Good Cents homes use “advanced framing” to improve the R-value of ceilings. Advanced framing provides enough height near the eaves to get at least R-38 all the way out to the area above exterior walls. Chapter 4 has illustrations of advanced frame ceilings.

Advanced framing changes the amount of insulation you use. The added height lets you install more insulation.

TIP: In some cases, the builder does not leave enough height for full R-38 blown-in insulation. To achieve R-38, use a material with more R-value per inch. For example, typical blown-in fiberglass requires about 15 inches for R-38. High density batts provide R-38 in about 10 inches. You can use batts near the eaves and blow the rest of the attic. Where local building codes allow, batts can replace vent baffles too, saving on the cost of installing separate baffles. Or you can make your own baffles using high R-value foam insulation. Make sure the foam has a flame spread rating of 25 or lower.

Ventilation in Attics

Most building codes, as well as the Super Good Cents program, require attics to be vented. You may not be responsible for providing vents, but if the vents are not there, let the general contractor hear about it.

If about half the vent area is low at the soffit, and half is high near the ridge, you should see 1 ft^2 net free area of vent per 300 ft^2 of ceiling. When all vents are on the same level (gable end vents), the venting requirement is 1 ft^2 net free vent area per 150 ft^2 of ceiling area.

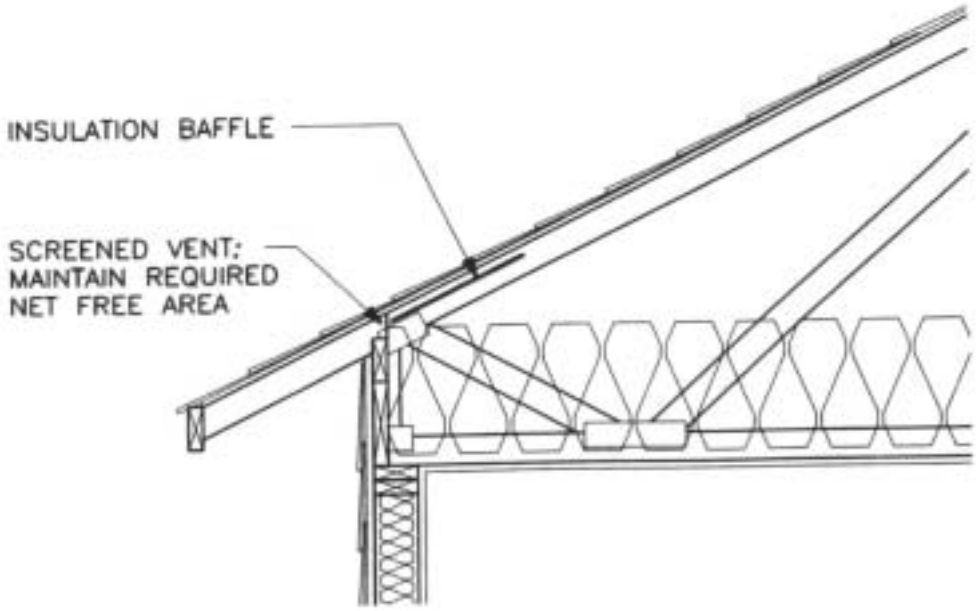
If the home has soffit or eave vents, make sure they are baffled to prevent blown-in insulation from blocking the flow of ventilation air. See Figure 10J. Vent baffles usually are installed by the framing contractor.

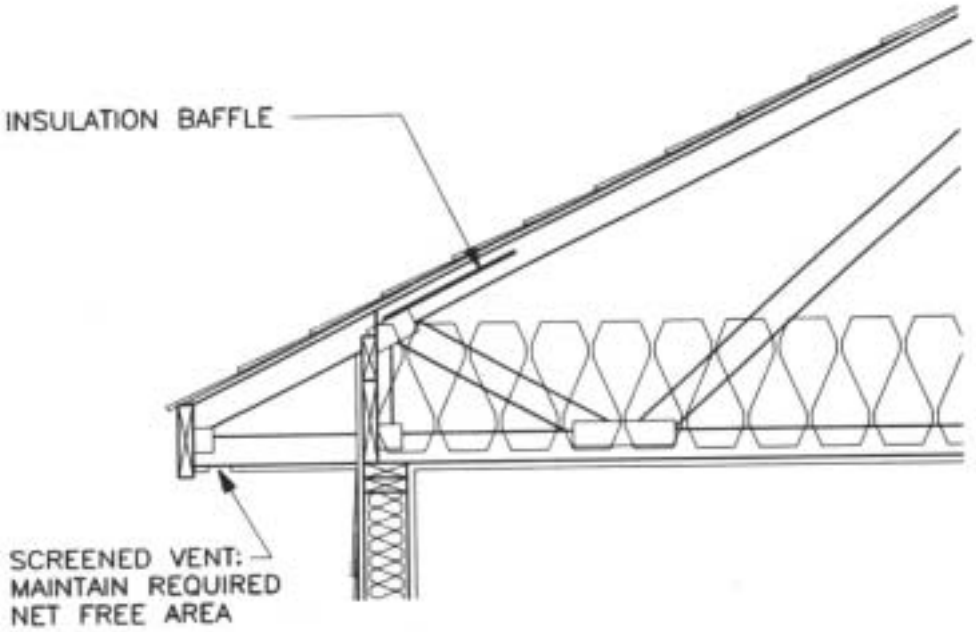
Vapor Retarders in Ceilings With Attics Above Them

1994 LTSGC 4.1.1

Most building codes do not require vapor retarders in ceilings below attic spaces. The Super Good Cents program, however, requires 1-perm vapor retarders in these ceilings.

Figure 10J
METHOD FOR BAFFLING AT EAVES





NOTE:
STATE CODE MAY SPECIFY HOW FAR THE BAFFLE MUST EXTEND BEYOND THE INSULATION.

The insulation contractor often installs a polyethylene vapor retarder in the ceiling when installing wall insulation. You also can meet the vapor retarder

requirement by installing faced ceiling batts. Since blow-in technology is quicker and cheaper than faced batts, faced batts are rarely used in attics.

Vapor retarder paint is another option for ceiling moisture protection.

IMPORTANT: Taping and texturing releases a lot of moisture in the home. Painting adds to the moisture buildup. Propane and oil-fired heaters are often used to dry tape and texture, but these combustion heaters produce a lot of moisture themselves. If you use polyethylene as the ceiling vapor retarder, insulate the ceiling immediately after the ceiling drywall is hung (and before taping and texturing). If the ceiling is not insulated immediately, the poly vapor retarder will be cold. In cold weather, moisture released inside the building during taping, texturing, and painting may reach its dew point at the cold vapor retarder and cause extensive moisture damage to the ceiling.

Do not lose a ceiling. If you use poly as a vapor retarder, schedule the ceiling insulation immediately after the ceiling drywall is hung. Encourage the drywall contractor and the general contractor to ventilate the building to get the moisture out.

VAULTED CEILING INSULATION

Super Good Cents vault insulation is R-38. This requires at least 12x rafters to leave an air space for ventilation above the insulation. Many scissor truss vaults, deep cavity flat truss vaults, and I-beam vaults are deep enough to easily accommodate R-38 insulation.

Open beam and deck vaults present the biggest challenge.

Vault Ventilation

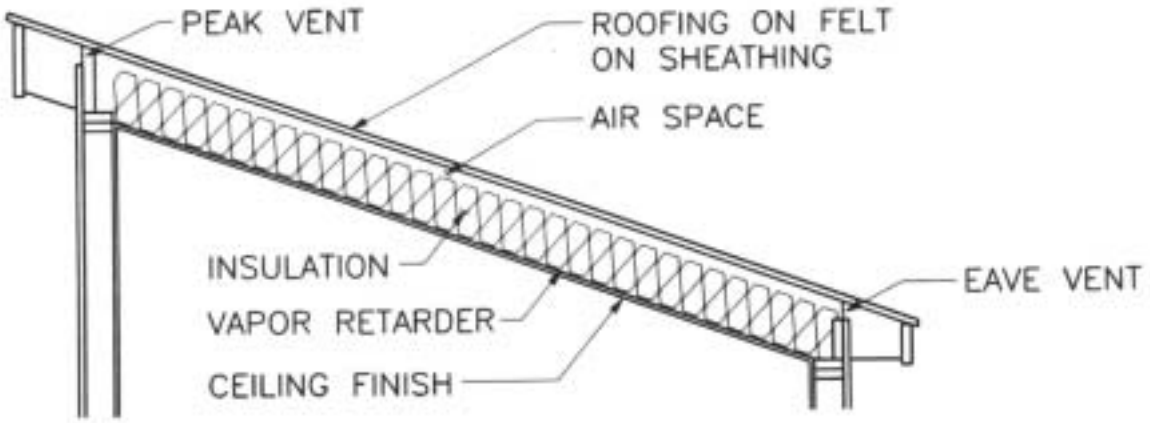
Vault ventilation is a controversial subject. The Super Good Cents program requires ventilation in all ceilings, including vaults. In some parts of the region, however, ventilation has been blamed for causing moisture problems in vaults. Local practice may allow closed cavity (unventilated) vaults. If there is a conflict between Super Good Cents ventilation specifications and local building code requirements, the building code takes precedence.

Figure 10K shows ventilated and closed cavity vaults.

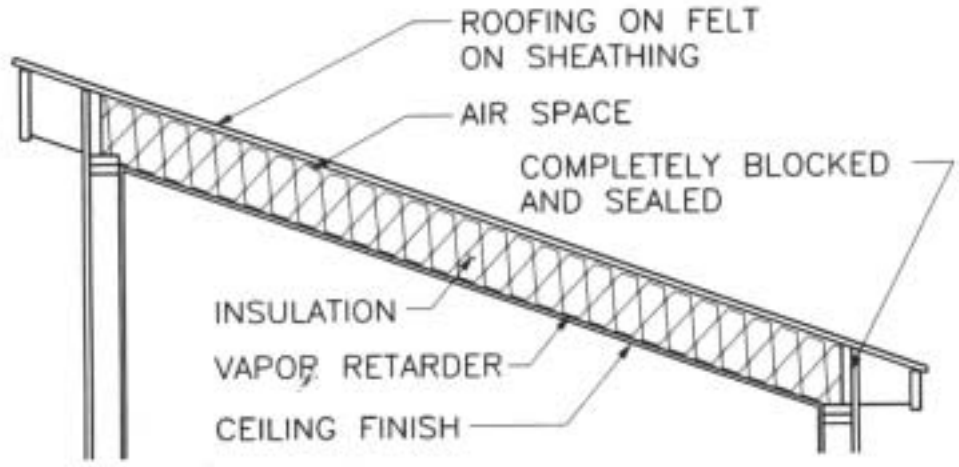
Most vault moisture comes from indoor air. The most important thing you can do to keep vault cavities dry is to thoroughly seal ceiling air leakage paths and install a vapor retarder on the warm side of the insulation.

Figure 10K
VENTILATED AND CLOSED CAVITY VAULTS

VENTILATED VAULT



CLOSED VAULT



The theory behind ventilating vaults is that any moisture that gets around the vapor retarder can be moved outside. Ventilation also helps avoid excessive heat buildup in vaulted ceilings in summer. Excessive heat can prematurely age composition roofing products. Some manufacturers of composition roofing void their warranties if their products are installed over unventilated areas. Excessive heat buildup also increases air conditioning costs.

Ventilation is easy in scissor truss vaults, deep cavity I-beam vaults, and flat truss vaults. There is plenty of room for insulation and plenty of air space left over to accommodate airflows through vault cavities. The trick is to provide air vents at both ends of the vault, so that air entering at one end can get out at the other end.

Screened vents at the wall or soffit are common. They let air into the cavity.

Continuous ridge and continuous vault vent products are less well known. They let air out all along the top of the vault. Individual roof jacks do not allow cross cavity ventilation. Holes drilled through rafters to facilitate cross cavity ventilation do not work well. Separate roof jacks for each cavity usually are visually unacceptable. Continuous ridge vents solve these problems and are visually unobtrusive.

The insulation contractor is caught in the middle. You need ventilation to protect insulation, but you are dependent on the designer to specify appropriate ventilation and on the framing contractor to cut in the vents. Insulation contractors are understandably wary of this issue, because they have been blamed for moisture problems in vaults.

The idea behind closed cavity vaults is that if you pack the vault full of insulation and do not let moisture-laden air in (from indoors or outdoors), you will not have a moisture problem. Whether this approach is successful depends on the effectiveness of ceiling air leakage control and the vapor retarder.

Vault Vapor Retarders and Air Sealing

Many building codes require a 0.5 perm vapor retarder in vaulted ceilings. This is a more stringent requirement than the Super Good Cents program’s 1.0 perm requirement. If local code calls for a 0.5 perm vault vapor retarder, follow the code. Four to six mil polyethylene or foil faced batts usually meet the 0.5 perm vapor retarder requirement. Paint-on vapor retarders require more than one coat in most cases. See Chapter 12.

The vapor retarder will not prevent moisture problems if wiring, lighting, and other penetrations into the vault are not sealed. Air leakage through ceiling penetrations is a much more significant source of moisture in vaults than vapor diffusion, which is what the vapor retarder addresses.

One easily missed air leak into vaults is at partition wall intersections. Seal the drywall to the top plate to prevent air inside the partition wall from leaking into the vault.

MISCELLANEOUS INSULATION APPLICATIONS

Skylight Wells

Skylights are popular in Northwest homes. Vertical walls below the skylight make up the "skylight well." These walls separate heated interior space from the unheated attic. They must be insulated to the same R-value as exterior walls. Vapor retarder requirements are the same as for exterior walls.

Below Grade Walls

1994 LTSGC 2.1.6

The Super Good Cents insulation requirement for below grade walls (in heated spaces) is R-21. Unless some part of the building structure is in the way, there is rarely a reason to use lower levels. Some building codes do not allow less than R-21 below grade under any circumstances.

Exterior insulation must extend from the top of the wall to the footing. Interior insulation usually is placed in 2x4 interior walls that are held in from the concrete to achieve the appropriate cavity depth. See Figure 10L.

Wall vapor retarder requirements also apply to below grade walls.

TIP: Because moisture can easily migrate through concrete, and because damp proofing may not be perfect, hold the interior framed wall in far enough so that installed insulation does not contact concrete.

Rim Joists

1994 LTSGC 2.1.7

Rim joists between heated floors of two-story homes and the rim over the mudsill in heated basements must be insulated to the wall R-value.

Figure 10L
BELOW GRADE INTERIOR WALL INSULATION